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10 CFR 50.73

U S Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Prairie Island Nuclear Generating Plant Unit 2  
Docket: 50-306  
Renewed License No. DPR-60

Licensee Event Report (LER) 50-306/2012-001-01, Unit 2 Manual Reactor Trip Due To Feedwater Heater Hi-Hi Alarm

Northern States Power Company, a Minnesota corporation, doing business as Xcel Energy, (hereafter "NSPM"), herewith encloses a revision of LER 50-306/2012-001-00 (ADAMS Accession Number ML12111A172).

On February 21, 2012, Prairie Island Nuclear Generating Plant (PINGP) Unit 2 was performing a normal shutdown in preparation for refueling outage 2R27. With Unit 2 at approximately 11.42% power, the reactor was manually tripped in accordance with the 21/22/23 Feedwater Heater (FWH) Hi-Hi alarm response procedure. There were no other unusual / not understood events associated with the shutdown.

The Equipment Cause Evaluation (ECE) determined that the third stage low-pressure FWH bypass line to the condenser is potentially restricting flow to the dump valve. The ECE also determined that the Moisture Separator Reheater Control valves are ramped closed earlier than necessary and are fully closed by approximately 20% reactor power. This causes excessive moisture in the extraction steam at low power and results in more water accumulating in the low-pressure feedwater heaters. Additionally, a "Root Cause Evaluation (RCE) determined that station implementation of the Corrective Action Program (CAP) and Equipment Reliability processes have not minimized risk of event recurrence while implementing long-term corrective actions by requiring interim/mitigating actions be taken prior to the next potential opportunity for recurrence."

Summary of Commitments

This letter contains no new commitments and no changes to existing commitments.

James E. Lynch  
Site Vice President, Prairie Island Nuclear Generating Plant  
Northern States Power Company - Minnesota

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Enclosure

cc: Administrator, Region III, USNRC  
Project Manager, PINGP, USNRC  
Resident Inspector, PINGP, USNRC  
Department of Commerce, State of Minnesota

**ENCLOSURE**

**LICENSEE EVENT REPORT 50-306/2012-001-01**

4 Pages Follow

<b>NRC FORM 366</b> (10-2010)		<b>U.S. NUCLEAR REGULATORY COMMISSION</b>		APPROVED BY OMB NO. 3150-0104		EXPIRES: 10/31/2013	
<b>LICENSEE EVENT REPORT (LER)</b> (See reverse for required number of digits/characters for each block)				Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0066), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.			
<b>1. FACILITY NAME</b> Prairie Island Nuclear Generating Plant Unit 2				<b>2. DOCKET NUMBER</b> 05000 306		<b>3. PAGE</b> 1 OF 4	
<b>4. TITLE</b> Unit 2 Manual Reactor Trip Due To Feedwater Heater Hi-Hi Alarm							
<b>5. EVENT DATE</b>			<b>6. LER NUMBER</b>			<b>7. REPORT DATE</b>	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY
02	21	2012	2012	- 001 -	01	3	20
						<b>8. OTHER FACILITIES INVOLVED</b>	
						FACILITY NAME DOCKET NUMBER	
						FACILITY NAME DOCKET NUMBER	
<b>9. OPERATING MODE</b>  Mode 1		<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>					
<b>10. POWER LEVEL</b>  11.42%		<input type="checkbox"/> 20.2201(b)		<input type="checkbox"/> 20.2203(a)(3)(i)		<input type="checkbox"/> 50.73(a)(2)(i)(C)	
		<input type="checkbox"/> 20.2201(d)		<input type="checkbox"/> 20.2203(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(ii)(A)	
		<input type="checkbox"/> 20.2203(a)(1)		<input type="checkbox"/> 20.2203(a)(4)		<input type="checkbox"/> 50.73(a)(2)(ii)(B)	
		<input type="checkbox"/> 20.2203(a)(2)(i)		<input type="checkbox"/> 50.36(c)(1)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(iii)	
		<input type="checkbox"/> 20.2203(a)(2)(ii)		<input type="checkbox"/> 50.36(c)(1)(ii)(A)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	
		<input type="checkbox"/> 20.2203(a)(2)(iii)		<input type="checkbox"/> 50.36(c)(2)		<input type="checkbox"/> 50.73(a)(2)(v)(A)	
		<input type="checkbox"/> 20.2203(a)(2)(iv)		<input type="checkbox"/> 50.46(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(v)(B)	
		<input type="checkbox"/> 20.2203(a)(2)(v)		<input type="checkbox"/> 50.73(a)(2)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(v)(C)	
		<input type="checkbox"/> 20.2203(a)(2)(vi)		<input type="checkbox"/> 50.73(a)(2)(i)(B)		<input type="checkbox"/> 50.73(a)(2)(v)(D)	
Specify in Abstract below or in NRC Form 366A							
<b>12. LICENSEE CONTACT FOR THIS LER</b>							
NAME Frank A. Sienczak				TELEPHONE NUMBER (Include Area Code) 651.388.1121 x4125			
<b>13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT</b>							
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT
<b>14. SUPPLEMENTAL REPORT EXPECTED</b>				<b>15. EXPECTED SUBMISSION DATE</b>		MONTH	DAY
O YES (If yes, complete 15. EXPECTED SUBMISSION DATE).				NO			
<b>ABSTRACT</b> (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)							
<p>On February 21, 2012, Prairie Island Nuclear Generating Plant (PINGP) Unit 2 was performing a normal shutdown in preparation for refueling outage 2R27. With Unit 2 at approximately 11.42% power, the reactor was manually tripped in accordance with the 21/22/23 Feedwater Heater Hi-Hi alarm response procedure. There were no other unusual / not understood events associated with the shutdown. The Equipment Cause Evaluation (ECE) determined that the third stage low-pressure FWH bypass line to the condenser is potentially restricting flow to the dump valve. The ECE also determined that the Moisture Separator Reheater Control valves are ramped closed earlier than necessary and are fully closed by approximately 20% reactor power. This causes excessive moisture in the extraction steam at low power and results in more water accumulating in the low-pressure feedwater heaters. "The RCE determined that station implementation of the Corrective Action Program (CAP) and Equipment Reliability processes have not minimized risk of event recurrence while implementing long-term corrective actions by requiring interim/mitigating actions be taken prior to the next potential opportunity for recurrence."</p>							

**LICENSEE EVENT REPORT (LER)**  
**CONTINUATION SHEET**

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**EVENT DESCRIPTION**

On February 21, 2012, Prairie Island Nuclear Generating Plant (PINGP) Unit 2 was performing a normal shutdown in preparation for refueling outage 2R27. With Unit 2 at approximately 11.42% power, the reactor was manually tripped in accordance with the 21/22/23 Feedwater Heater<sup>1</sup> Hi-Hi alarm response procedure. There were no other unusual / not understood events associated with the shutdown.

**EVENT ANALYSIS**

Condensate is taken from the condenser<sup>2</sup> hotwell by the condensate pumps<sup>3</sup> and pumped through the filter/demineralizer system<sup>4</sup> or its bypass line, the air ejector<sup>5</sup> condensers, gland steam<sup>6</sup> condenser, and low pressure (LP) heaters to the suction of the feedwater pumps<sup>7</sup>. The feedwater pumps then send feedwater through the high-pressure heaters to each steam generator.

The two main feedwater pumps operate in series with the condensate and the heater drain pumps, discharging through check valves and motor-operated gate valves into the No. 5 heaters. The feedwater flows through the two parallel, high-pressure feedwater heaters and flows into a common header. Two lines feed the two steam generators from the header.

Reheaters are provided with drain tanks and level controls. All the low-pressure feedwater heaters, No. 21, 22, and 23, are located in the condenser neck. Feedwater heaters No. 21 and 22 are combined into one shell (duplex) with bolted-head construction. Feedwater heater No. 21 is provided with a separate Feedwater Heater Drain Cooler.

The level controllers operate the emergency drain dump valves which dump the various drains directly to the condenser in case of abnormally high level. Three half-capacity, vertical, centrifugal heater drain pumps are provided for pumping the heater drainage into the condensate line ahead of the feedwater pumps. The pumps are started and stopped from the main control board. Tank level is controlled by variable-speed pump drives.

The sizing and operation of the Feedwater Heater (FWH) level control system at PINGP has not changed or degraded recently in a way that would have caused the Hi-Hi feedwater levels. Further, no equipment malfunctions were identified. With no degraded or nonfunctioning components discovered and the sizing of the control valve and piping being the same as original design, the issue points to both an existing vulnerability in the system, and also recent operational changes.

<sup>1</sup> EIS System Code: SB  
<sup>2</sup> EIS System Code: SG  
<sup>3</sup> EIS Component Identifier: P  
<sup>4</sup> EIS System Code: SF  
<sup>5</sup> EIS System Code: SH  
<sup>6</sup> EIS System Code: TC  
<sup>7</sup> EIS System Code: SJ

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The manual actuation of the Reactor Protection System (RPS)<sup>8</sup> in accordance with the 21/22/23 Feedwater Heater Hi Hi alarm response procedure is reportable under 10 CFR 50.73(a)(2)(iv)(A).

### SAFETY SIGNIFICANCE

This event did not challenge nuclear safety as all plant systems responded as designed. Therefore, this event does not represent a safety system functional failure for Unit 2. However, the reactor was manually tripped in accordance with the alarm response procedure. After the reactor trip, Unit 2 continued the planned 2R27 shutdown to Mode 5. Therefore, there were no radiological, environmental, or industrial impacts associated with this event and PINGP did not affect the health and safety of the public.

### CAUSE

The Equipment Cause Evaluation (ECE) determined that the third stage low pressure FWH bypass line to the condenser is potentially restricting flow to the dump valve. This by-pass line is presently two inches in diameter and supplies flow to a four inch control valve. Increasing this line to a larger diameter pipe will eliminate a restriction point for condensation to exit the third stage FWH.

The ECE also determined that PINGP ramps the Moisture Separator Reheater Control valves closed earlier than necessary and are fully closed by approximately 20% reactor power. This causes excessive moisture in the extraction steam at low power and results in more water accumulating in the low-pressure feedwater heaters.

A Root Cause Evaluation (RCE) was conducted on the adverse trend of repeated events. From November 1998 to February 2012, there have been eight instances of Feedwater Heater Hi-Hi Level Alarms leading to reactor and/or turbine trips at PINGP Units 1 and 2. The RCE determined that station implementation of the Corrective Action Program (CAP) and Equipment Reliability processes have not minimized risk of event recurrence while implementing long-term corrective actions by requiring interim/mitigating actions be taken prior to the next potential opportunity for recurrence.

### CORRECTIVE ACTIONS

1. Start up and shut down procedures will be revised to preclude potential trip on Hi-Hi low-pressure feedwater heater level. This includes the associated Alarm Response Procedures and determining if the step to trip the turbine or reactor on Hi-Hi LP FWH level is necessary.
2. The adverse trend with respect to Feedwater Heater Hi-Hi Level Alarms was identified as a programmatic weakness. RCE 01326556-01 has been initiated to address the issue.
3. Revise operating procedures 1(2) C1.4, Unit 1 (2) Power Operations based on increasing superheat temperatures to the Low Pressure (LP) turbine to match Westinghouse operational requirements as outlined in VTM XH-2-165-5 and VTM XH-2-164-1.

<sup>8</sup> EHS System Code: JC

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4. RCE action: Establish an expectation for ACE/ECE/RCE grading to identify potential future risk associated with long-term actions and require Specific Measurable Accountable Reasonable Timely Sustainable (SMARTS) strong interim/mitigating actions in the short term.
5. RCE action: Establish an expectation at PINGP to review selected completed equipment related cause evaluations (primarily ECE and RCE) at Plant Health Committee (PHC) for challenging and gaining alignment on performing the recommended equipment actions, both interim/mitigating and long term.
6. RCE action: Implement a process/procedure that provides management with the aggregate risk(s) based upon event specific vulnerabilities that exist within the group of systems required to provide the safety function. The process/procedure should provide for a minimum of a quarterly assessment that is reviewed by PHC for the purpose of identification and commitment to work that will resolve specific equipment issues that are driving increased risk on Mitigating System Performance Index (MSPI) system groupings. Integration with Work Management and PHC procedures is required for completion of this action.

**PREVIOUS SIMILAR EVENTS**

A LER search was conducted and no similar events involving a manual reactor trip in accordance with an alarm response procedure were identified in the last three years at PINGP.

However, the low pressure feedwater heater level indication reading Hi Hi at low power operations is a repeat event that led to a turbine trip on PINGP Unit 1 in April of 2011 (Apparent Cause Evaluation (ACE) 01283119). Corrective actions from this ACE included an Engineering Change (EC) to modify the Feedwater Heater Piping and a Condition Evaluation (CE) to evaluate revisions to shutdown operating procedures. An Equipment Improvement Long Range Plan Request (EIR) to obtain funding for a modification study of the LP FWH piping systems has been submitted.

Also, in June of 2005, while taking PINGP Unit 2 off line, immediately after opening the Unit 2 generator output breakers, the control room received a 21/22/23 Feedwater Heater Hi Hi Level Alarm. The operators manually tripped the turbine per the alarm response procedure (Action Request (AR) 00855993). AR 00855993 was written to document the event and stated that this had happened previously in November 2004 while performing the Turbine Overspeed Trip Exercise Surveillance Procedure (SP) 1036 for PINGP Unit 1. A CE determined that an engineering evaluation (EWR039553) was needed to evaluate the known deficiencies. No information could be found regarding this engineering evaluation.

This adverse trend with respect to Feedwater Heater Hi-Hi Level Alarms at PINGP was identified as a programmatic weakness. Root Cause Evaluation (RCE) 01326556-01 has been initiated to address the issue.